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A MECHANICAL EXTRACTION APPARATUS

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A dual-purpose extraction rack (Mann 1), designed and constructed in this laboratory, facilitated the handling of a large number of separatory funnels during the colorimetric determination of DDT in milk and fats by the method of Schechter et al. (2). However, even with this rack the determination procedure was still tiresome and time-consuming, and required an unduly large amount of acid because the extraction was not carried to completion. A mechanical extraction apparatus that cuts in half both the extraction time and the acid requirements has now been devised. The design of this rack is based on the same principle as the one previously described.

This apparatus has two banks of eight 500-ml. separatory funnels one above the other (fig. 1, A). Each bank is hinged (fig. 2, B) to a carriage (C) so that during the extractions it can be folded backward until the funnels are at about a 60-degree angle, with the stoppers resting on a strip of foam rubber mounted on a board (D). Each bank consists of three notched boards, one (figs. 3 and 4, I) to fit above the stopcocks to hold the funnels in the normal position and two others (H and F) to fit around the necks of the funnels to keep them in the banks when they are upside down. Board F is attached to board H with hinges (fig. 3, G) made by welding together pieces of two screen-door holders. With these spring-type hinges, F can be kept down around the necks of the funnels during the extraction but can be easily raised to remove them when the extraction is completed. Each bank of funnels is shaken back and forth on a horizontal track (fig. 1 and 2, E) by a 2-inch driving arm attached to the shaft of a 1:10 reducing gear (K) connected to the carriage by a 9-inch connection rod (L). A 1/8-hp. motor (J) with a capacity of 1140 r.p.m. furnishes the shaking power for each bank.

After the extraction both banks of funnels are turned down to their normal position on the shelves (fig. 5, N) which are mounted on an upright bar attached to the framework so that the tips of the funnels in the upper bank will be directly over and close to the necks of the funnels below (fig. 3).

During the last half of the last sodium sulfate-sulfuric acid extraction the upper bank is elevated with pins (fig. 5, M), so that the lower bank can be folded back in the shaking position. After the extractions have

JUL 1 -

been completed, the chloroform solutions are combined in the upper funnels. The lower funnels are cleaned with warm water, the upper bank is kept in the elevated position, and the chloroform solutions are filtered through plugs of cotton held in glass Gooch crucible holders, which rest in the necks of the lower funnels as shown in figure 1. Here the chloroform solutions are washed with a sodium bicarbonate solution and again filtered through plugs of cotton into 500-ml. Erlenmeyer flasks with standard 24/40 joints.

A time switch has proved valuable in the extractions, but safety switches (fig. 5, O) are then necessary to cut off the motor in case the time switch is turned on accidentally when the bank is in the normal position.

Literature Cited

(1) Mann, H. D.
1947. A dual-purpose extraction rack. U. S. Bur. Ent. and Plant Quar. ET-243, 2 pp., illus. [Processed.]

(2) Schechter, M. S., Pogorelskin, M. A., and Haller, H. L.
1947. Colorimetric determination of DDT in milk and fatty materials. Indus. and Engin. Chem., Analyt. Ed. 19: 51.

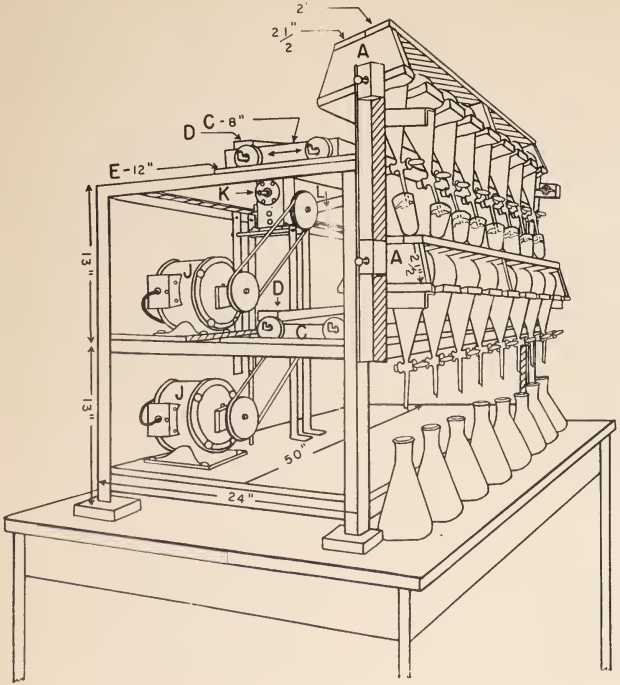

Figure 1.--Extraction apparatus with the upper bank of separatory funnels in the elevated position for filtration.

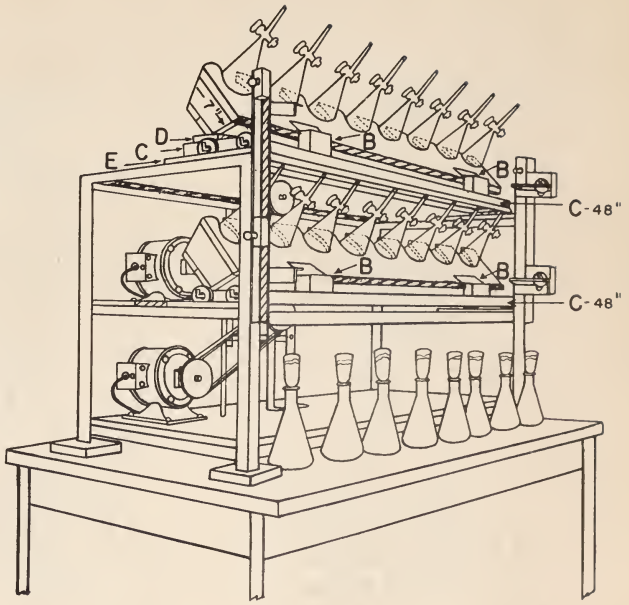

Figure 2.--Extraction apparatus with both banks of separatory funnels folded backward ready for shaking.

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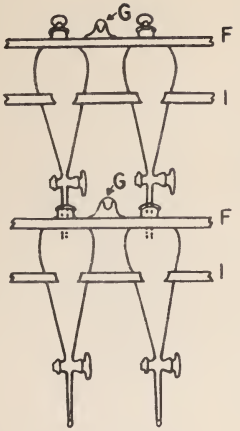

Figure 3.--Portion of two banks of funnels with tips of upper bank directly over and close to necks of funnels below.

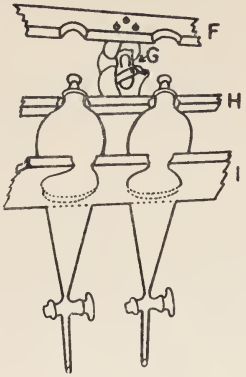

Figure 4.--Portion of a bank of funnels with notched board (F) raised for insertion or removal of funnels.

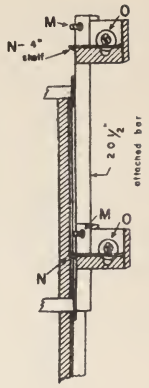

Figure 5.--Pins (M), shelves (N), and safety switches (O) on attached bar.

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